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ABSTRACT

With the goal of academic excellence for all students in mind, The College Board's EQUITY 2000 educational reform program was designed to test the hypothesis that enrollment and success in the gatekeeper courses of algebra and geometry will bridge the gap of achievement and college-going rates between minority/nonminority students and economically advantaged/disadvantaged students. As such, the project's goal is not only to bring about change in student achievement levels but also to influence educational policies and practices with regard to tracking, professional development, guidance and counseling, and educational leadership within and across the school districts that participated in the pilot phase of the effort. This report provides a summary of what the evaluation efforts suggest thus far about the project's overall effectiveness at the six pilot sites. Given the length of the program's pilot phase and the long-term outcomes it seeks (i.e., closing the gap in college-going rates), it is not yet possible to document the full effects of EQUITY 2000. Thus, the conclusions reached in this report are based on the reviews of the project's initial set of indicators such as growth in enrollment and achievement in algebra and geometry; changes in teaching practices in mathematics classrooms; as well as shifts in attitudes and perceptions of faculty, staff, and students about learning at higher levels and subsequent success in college. This report aims to inform and assist a variety of stakeholders including the College Board's leadership, the program's executive director, and others as they plan and coordinate efforts for the dissemination of EQUITY 2000. Appended to the document are enrollment comparisons for algebra and geometry, 1991-1997. (ASK)

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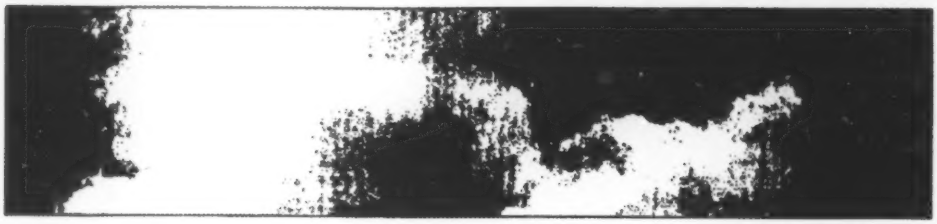

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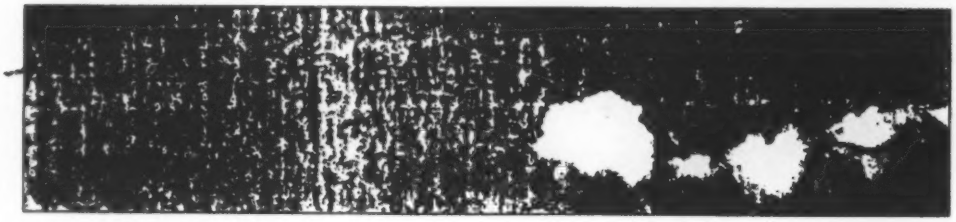

Preliminary Evidence of Effectiveness

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Signs of Success

EQUITY 2000

Preliminary Evidence of Effectiveness

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Founded in 1900, the College Board is a national, nonprofit membership association of schools, colleges, and other educational organizations working together to help students succeed in the transition from school to college. The Board meets the diverse needs of schools, colleges, educators, students, and parents through the development of standards of excellence; by providing programs and services in guidance, assessment, admission, placement, financial aid, and teaching and learning; and by conducting forums, research, and public policy activities. In all of its work, the Board promotes universal access to high standards of learning, equity of opportunity, and sufficient financial support so that every student has the opportunity to succeed in college and work.

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Contents

Introduction 1

The Evaluation Process 2

Signs of Change 6

Districtwide Policy Reform:
An Educational Reform Model 6

Changing Attitudes and Expectations 7

Changing Enrollment
and Achievement Trends 11

Enrollment Trends 12

Mathematics Achievement 14

Evidence of Progress 17

Changing Students' Skills
and Knowledge Base 17

EQUITY 2000's Contribution
to Educational Reform 21

Conclusion 22

Appendix: Site Enrollment by Ethnicity 24

Introduction

From the standpoint of theory and practice, EQUITY 2000 is one of the more complex reform efforts underway in U.S. education today. With the goal of academic excellence for all students in mind, the College Board's EQUITY 2000 educational reform program was designed to test the hypothesis that enrollment and success in the gatekeeper courses of algebra and geometry will bridge the gap in achievement and college-going rates between minority/nonminority students and economically advantaged/disadvantaged students. As such, the project's goal is not only to bring about change in student achievement levels, but also to influence educational policies and practices with respect to tracking, professional development, guidance and counseling, and educational leadership within and across the school districts that are participating in the pilot phase of the effort.

Beginning in 1990 as a mathematics initiative in one school district in Fort Worth, Texas, EQUITY 2000 has continued to expand and evolve to include in 1995-96 six sites and 14 school districts. As the program evolved, it developed a componential model of reform that is intended to work on two levels: first, a mathematics reform effort based on the principle that all students enroll in rigorous, well-designed courses in algebra and geometry that provide them with the mathematical knowledge and skills to ensure success in college; and second, a systemic reform initiative that advocates detracking in all K–12 courses and that goes further to involve all of the stakeholders in the school district, including the superintendent and the school board as well as school principals, teachers, guidance counselors, and parents. Working in concert to effect change in the district, the six components of the model include: districtwide policy change with respect to detracking algebra and geometry courses; professional development for teachers, counselors, and principals; student academic enrichment programs; parental involvement activities; partnerships with higher education and the community; and the use of disaggregated data to drive reform.

Although the project is still evolving and much is yet to be learned about school reform, this report provides a summary of what the evaluation efforts suggest thus far about the project's overall effectiveness at the six pilot sites. Given the length of the program's pilot phase and the long-term outcomes it seeks (i.e., closing the gap in college-going rates), we cannot as yet document the full effects of EQUITY 2000. Thus, the conclusions reached in this report are based on our review of the project's initial set of indicators, such as growth in enrollment and achievement in algebra and geometry, changes in teaching practices in mathematics classrooms, as well as shifts in attitudes and perceptions of faculty, staff, and students about learning at higher levels and subsequent success in college. We hope that this report will inform and assist a variety of stakeholders, including the College Board's leadership, the program's executive director, and others, as they plan and coordinate efforts for the dissemination of EQUITY 2000.

The Evaluation Process

Seven key research questions provide the framework for the evaluation of EQUITY 2000. These questions and the sources of evidence to address them are presented in Table 1.

Table 1. **Key Evaluative Issues and Sources of Evidence**

The Questions	Sources of the Evidence
What effect has EQUITY 2000 had on attitudes, behaviors, and expectations regarding college attendance and completion by minority students?	• Survey of Changes in Mathematics Teachers' Perceptions, Plans, and Attitudes • Survey of Changes in Guidance Counselors' Perceptions, Plans, and Attitudes • Focus Groups • Eighth Grade Student Perceptions and Attitudes Toward Math and College
Is the number of students enrolling in and completing algebra and geometry increasing?	• Algebra and Geometry Enrollment and Achievement Data
Are students acquiring the skills and knowledge that will give them access to college?	• Enrollment and Completion Indicators • Mathematics Classroom Observations • Focus Groups • Surveys and Observations, from Teaching and Learning Study • AP, PSAT/SAT, and ACT Test-Taking Trend Data
How does EQUITY 2000 contribute to educational reform?	• Interviews with District and School Staff, Students, and Parents • Mathematics Classroom Observations by Independent Evaluation Teams
Which components of EQUITY 2000 work best, why, and for whom?	• Interviews with District Administrators, School Board Members, Mathematics Teachers, Guidance Counselors, Principals, Students, and Parents • Observations of Schools including Mathematics Classrooms, Labs, Offices, Library, Career/College Centers, Alternative Classrooms, and Saturday Academies • Review of District Documents and Site Evaluation Reports

Table 1. **Key Evaluative Issues and Sources of Evidence *(continued)***

The Questions	Sources of the Evidence
How can EQUITY 2000 be replicated in other school districts in the nation?	• Interviews with District Administrators, School Board Members, Mathematics Teachers, Guidance Counselors, Principals, Students, and Parents • Observations of District Culture and Mission, and Schools, including Mathematics Classrooms and Labs, Offices, Libraries, Career/College Centers, Alternative Classrooms, Saturday Academies • Student Achievement Data • Principal Focus Groups
Has EQUITY 2000 contributed to closing the gap in the college-going rates between minority and majority students?	• Longitudinal Study of Student Cohorts through College Enrollment and Freshman Year Retention and Achievement (Proposed Study)

Because EQUITY 2000 is a broad-based, top-down and bottom-up reform initiative, our evaluation efforts are designed to study the program from a number of vantage points including its effects on districtwide policies, how it has helped to shape the attitudes and expectations of students, teachers, counselors, and others in the district, as well as its effects on teaching, learning, and student achievement in mathematics. From a methodological perspective, the evaluation research design includes a five-part strategy to document EQUITY 2000's effectiveness as a reform effort; this strategy is presented in Table 2. Members of the various evaluation teams are listed in Table 3. As Tables 1 and 2 indicate, whenever and wherever appropriate, we have relied on both qualitative and quantitative measures to provide indicators of the program's effects within and across sites, including: (1) algebra and geometry enrollment and achievement trends; (2) observations of mathematics classrooms, computer labs, schools, libraries, career/college resource centers, and Saturday Academies; (3) focus groups and interviews with district level administrators, school board members, principals, mathematics teachers, guidance counselors, students, and parents; (4) reports and self-evaluations prepared by each site; (5) surveys of three eighth-grade student cohorts; and (6) trends in assessment results from a number of nationally administered programs (e.g., AP and college admission tests). Together, these indicators will provide evidence of the program's effectiveness.

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Table 2. **Overview of the Evaluation Research Strategy**

Research Strategy	Purpose
Summative and Formative Evidence (Contractor: Pelavin Research Institute)	To verify enrollment and achievement indicators; to provide classroom observation analysis as well as focus group analysis of teachers, counselors, site coordinators, and principals; and to conduct and analyze surveys of teachers, counselors, and students.
Observational Studies of Each Site (Contractors: Human Resources Research Organization, Research and Evaluation Associates, and others; see Table 3)	To document how each site has changed as a result of the implementation of EQUITY 2000, through case study reports for each site.
In-Depth Study of Mathematics Teaching and Learning (Contractor: Harvard Graduate School of Education)	To observe the effects of teaching practices in mathematics classrooms and their impact on student learning. ***(One site)***
Quantitative Analysis of Test-Taking Data and Student Achievement (The College Board's Office of Research)	To synthesize test-taking trends and achievement data from the College Board's PSAT, AP, and SAT programs across all seven sites.
EQUITY 2000 Replication Study (Contractor: Manpower Demonstration Research Corp.)	To study how EQUITY 2000 could be evaluated and replicated in new sites.

Table 3. **The EQUITY 2000 Evaluation Team**

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Daniel Mayer

Signs of Change

At this point in the evaluation process, we are prepared to present and discuss evidence that addresses four of our key research questions. In particular, they are:

- What effect has EQUITY 2000 had on the attitudes, behaviors, and expectations regarding college attendance and completion by minority students?
- Is the number of students enrolling in and passing algebra and geometry increasing?
- Are students acquiring the skills and knowledge that will give them access to college?
- How does EQUITY 2000 contribute to educational reform?

As we examine this body of evidence, we will consider what the districts looked like in 1991-92 prior to EQUITY 2000 and what they looked like in 1995 after implementing the program for four years. In general, when a district moves to implement EQUITY 2000, it does so in ways that are compatible with its resources, structure, and culture. As such, we should expect to see some natural variation in the scope and pace of their implementation efforts, and we must view the evidence in that light.

Districtwide Policy Reform: An Educational Reform Model

At the heart of the model is the equity principle of all students being given the opportunity to achieve.

EQUITY 2000's reform efforts are based on a six-part model of districtwide change. At the heart of the model is the principle that all students are given the opportunity to demonstrate high levels of academic achievement. In practice, this requires that districts implement policies that allow all students access to high-level courses typically available only to the college-bound, starting with access to gatekeeper courses such as algebra and geometry. In addition to policy changes, the model includes five other components designed to support policy change and foster reform, including the use of disaggregated data to drive decisions, professional development, academic enrichment activities, increased parental involvement, and partnerships with higher education and the community. EQUITY 2000's reform-minded model also stresses equity, pedagogy, and content. Without this emphasis on *districtwide* change and the interaction of the model's six components, EQUITY 2000 would be similar to other reforms that are implemented in isolated schools or classrooms and focus on pedagogy or content. The literature on educational reform has highlighted the transitory nature of most school-based efforts. The districtwide nature of EQUITY 2000 represents a deliberate strategy to ensure that reform is more systemic, one that addresses issues of policy, practice, and institutionalization across the entire district.

In this report we focus on what the evidence is telling us with respect to EQUITY 2000's impact on systemic change. We look, for example, at how the model has been implemented as well as how it is working to promote policy change, foster institutionalization in the districts, facilitate shifts in attitudes about teaching and learning, support professional development, and enhance student achievement. We begin our presentation of the evidence by examining changes in the attitudes and expectations of teachers and counselors of students' potential. This is followed by a discussion of the trends in enrollment and student achievement in algebra and geometry courses. Evidence is then presented on changes in students' mathematical skills and knowledge. We conclude with a discussion of how the EQUITY 2000 model contributes to systemic reform across the districts in our study.

Changing Attitudes and Expectations

One goal of EQUITY 2000 is to help shape the attitudes and expectations of students, teachers, counselors, and others in the district regarding the potential of minority and disadvantaged students to attain high levels of academic achievement and to succeed in school, and ultimately, in college. As one aspect of the six-part EQUITY 2000 model, the professional development component emphasizes that counselors and mathematics teachers have a critical and key role in affecting student attitudes toward academic success. The counselor's role is to schedule courses, provide academic guidance and assistance to students in need, and nurture students' college-going aspirations and career plans. Teachers, on the other hand, influence student learning and achievement every day in their classrooms. Therefore, fostering change in the attitudes of counselors and teachers about their students' capabilities and aspirations is a key element in the model. The evidence here comes from surveys and focus groups of counselors and teachers.

The reform model has been used as a basis for district strategic plans or has been incorporated as part of the district mission.

Guidance Counselors

The College Board has supported extensive professional development activities for guidance counselors in the participating school districts since the beginning of the EQUITY 2000 project. Each summer since the inception of the program, counselors and teachers have attended summer institutes to learn new methods for advising and teaching students. In 1992 we took the opportunity to survey counselors' attitudes prior to and after the institute. Moreover, follow-up surveys for this group of counselors were administered again in 1994. The survey data presented in Figures 1 and 2 below provide us with a useful barometer of shifts in their attitudes and expectations over the course of the pilot phase. The data analyzed thus far suggest that counselors' attitudes and expectations regarding students' ability to attend and graduate from college have changed markedly.

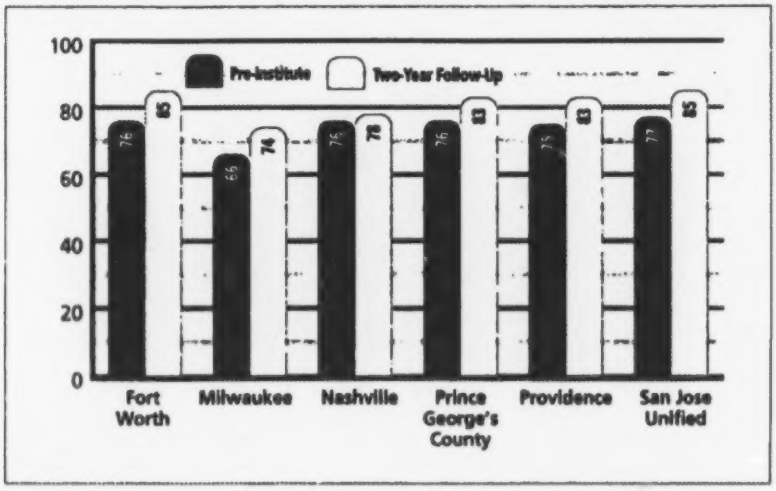

Figure 1. Shifts in Counselors' Attitudes Regarding Students' Ability to Attend College, 1992 and 1994

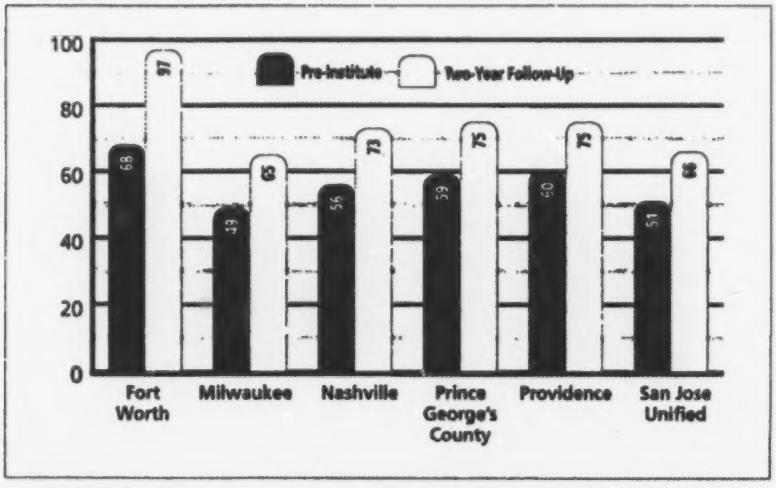

Figure 2. Shifts in Counselors' Attitudes Regarding Students' Ability to Graduate from College, 1992 and 1994

In Figure 1, when we look across all sites, we see that prior to their participation in the summer institutes, the counselors surveyed estimated that 66 to 77 percent of students were capable of attending college. Two years later the counselors' attitudes had shifted, and they reported higher estimates of the number of students capable of attending college, increasing to 74 to 85 percent across the sites. Similarly, in Figure 2 we see that counselors' estimates regarding students' ability to graduate from college also increased over the same two-year period. Before participating in the summer institutes, counselors believed that 49 to 68 percent of students were capable of graduating from college. Two years later those estimates rose to 65 to 97 percent.

In addition to shifts in expectations about students, the surveys also indicated that the professional development experiences better prepared them to work with other school-based professionals, e.g., teachers, curriculum specialists, and administrators, on issues related to students' aspirations and expectations about going to college. They also said they felt better prepared to counsel parents concerning their expectations and beliefs about their children's achievement. Counselors also told us of the need for more resources to make students and their parents more aware of the college admission process and financial aid opportunities.

In all, these data point to the power of combining professional development activities and experience working in EQUITY 2000 districts to produce change in counselors' views of their students' ability to attend and graduate from college. Keeping in mind the central role that expectations and aspirations play in affecting the college-going rates of minority and disadvantaged students, these survey and focus group results are indicators of EQUITY 2000's effectiveness in changing the odds for minority and disadvantaged students in these schools.

Teachers

Attitudinal data on teachers came from surveys conducted by Pelavin Research Institute prior to and after they took part in a number of Summer Mathematics Institutes offered by EQUITY 2000 throughout the pilot phase of the program. These summer institutes were organized around the three underlying themes of the EQUITY 2000 model: equity, pedagogy, and content. Pre- and post-institute surveys were designed to assess changes in teachers' plans for instruction in algebra and geometry, i.e., using manipulatives, calculators, and cooperative learning methods, as well as to measure shifts in their expectations about student learning. Like the findings from the counselor surveys, the data from the teachers surveyed across all three years and all sites indicate that their expectations about student learning and achievement have changed, with the majority believing that their teaching can improve and that their students can learn the higher-level mathematics needed for success in college.

More to the point, teachers' estimates of the number of students capable of taking and passing algebra and geometry increased. Further, the data from follow-up surveys show that teachers who attended two summer institutes generally had higher estimates than teachers who only attended one institute. For example, teachers surveyed prior to attending the 1993 institute estimated that 60 percent of their students could pass algebra; two years later they estimated that 62 percent were capable of passing this course. Teachers attending both the 1992 and 1993 institutes, however, showed a higher increase in their estimate of students capable of passing algebra, going from 68 percent in 1992 to 74 percent two

Overall, the enrollment trends suggest the program is approaching its stated objective.

years later. Similar shifts in attitudes were found for geometry. Teachers attending two institutes, for example, increased their estimates from 60 percent in 1992 to 68 percent in 1994.

Like the counselors, teachers were also asked to estimate the number of students capable of attending and doing well in college. Unlike the estimates of algebra and geometry passing, the number of institutes attended does not appear to have as much impact on the teachers' estimates of college-going and graduation. With respect to attending college, teachers estimates after attending one or two institutes rose from 64 to 69 percent. When it came to estimating students' ability to graduate from college, those attending one or both institutes had estimates that increased from 54 to 62 percent. In general, the teachers' estimates were not as high as the counselors' estimates, suggesting that the daily interaction with students—both in terms of coursework and assessments—may have served to dampen teacher expectations slightly.

In sum, more and more teachers voiced increased confidence about what their students could learn and go on to do after high school. In addition, the teachers reported taking on the role of advising student's about postsecondary opportunities. They reported talking more frequently with economically disadvantaged and minority students about college opportunities as well as helping them with plans for college. The two-year follow-up of teachers participating in the 1992 Summer Mathematics Institutes indicated that 89 percent of the teachers would discuss postsecondary opportunities with economically disadvantaged or minority students; across sites the percentage ranged from 79 to 95 percent. A follow-up survey of 1993 institute participants revealed that across sites 89 to 100 percent of the teachers discussed college opportunities with disadvantaged and minority students. Like the counselors surveyed, the teachers reported that the combination of professional development and school-based experiences produced sustainable changes in attitudes. Teachers participating in the focus groups at all sites often gave personal testimonials to the changes they had experienced in student classroom behaviors and academic performance when they had changed their own levels of expectations for their students' performance. These teachers expressed their conviction that students' learning was directly related to their own personal attitudes and expectations. Many teachers also told us that an increasing number of their peers were accepting the principle of maintaining high expectations as a direct and indirect result of EQUITY 2000 training activities.

Again, these are positive indicators of EQUITY 2000's success in changing the odds for minority and disadvantaged students at these sites. What we see from both the surveys and the focus groups is evidence of the effectiveness of the professional development component of the EQUITY 2000 model in changing the attitudes and expectations of teachers and counselors regarding student academic achievement.

Changing Enrollment and Achievement Trends

The trends in enrollment in algebra and geometry and in student achievement in these courses provide a quantitative indicator of the success of the program. As context for the presentation of these findings, it is important to note that the sites varied with respect to when they implemented the program and when they expected to enroll 100 percent of their students in algebra and geometry. One site implemented the program in 1990-91 (Fort Worth). The remaining five sites started the program in 1991-92. Keep in mind that it takes several years for reform efforts of this nature to reach maturity. The first full cohort of students affected by EQUITY 2000 were twelfth graders in 1995-96. The second cohort of students reached the twelfth grade in fall 1996; they were the first group to receive the full impact of the policy change. Consequently, we do not expect to see evidence of changes in the college-going rates until 1997, 1998, and beyond.

Table 4 shows the year that each site expected to meet its enrollment targets in algebra and geometry according to the agreements signed with the College Board. For reporting purposes, The San Jose Consortium site is presented as two data sets: East Side Union (a 9–12 district) and San Jose Unified (a K–12 district).

Table 4. Each Site's Targeted Enrollment Year

Site	All 9th Graders in Algebra	All 10th Graders in Geometry
East Side Union	1994–95	1994–95
Fort Worth	1994–95	1995–96
Milwaukee	1993–94	1994–95
Nashville	1993–94	1994–95
Prince George's County	1994–95	1994–95
Providence	1993–94	1993–94
San Jose Unified	1993–94	1995–96

In Table 4 we see that sites followed different timetables depending on the needs of their districts. Not all sites set the same enrollment deadlines for ensuring that all students would be taking algebra I by the ninth grade and geometry by the tenth. For example, three of the sites, East Side Union, Fort Worth, and Prince George's County, agreed to enroll all ninth-grade students in algebra in the 1994-95 year, while the other four sites agreed on the 1993-94 year. Providence agreed to enroll all students in geometry in 1993-94, while four sites chose 1994-95 and two decided on 1995-96. Keeping the varying enrollment targets in mind, we now present the enrollment and achievement trend data. For

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ease of presentation, we will use 1991-92 as a baseline year across all sites and compare it to the enrollment and achievement data for the academic year 1994-95.

Enrollment Trends

Algebra

Enrollment levels in algebra I and higher math courses were collected for all ninth graders in the fall of the school year, usually in October. The compelling data in Figure 3 show site enrollment trends before and after participation in EQUITY 2000. Overall, the enrollment trends suggest the program is approaching its stated objective of 100 percent enrollment in algebra or higher by the ninth grade. Algebra I enrollment for ninth graders has increased since 1991 at all sites. In 1991-92, enrollment of ninth-grade students in algebra I or higher ranged from 31 to 69 percent. By 1994-95, enrollment in algebra I or higher ranged from 61 to 100 percent across the sites. These gains are impressive when placed in the context of the enrollment rates in this key course prior to the implementation of EQUITY 2000.

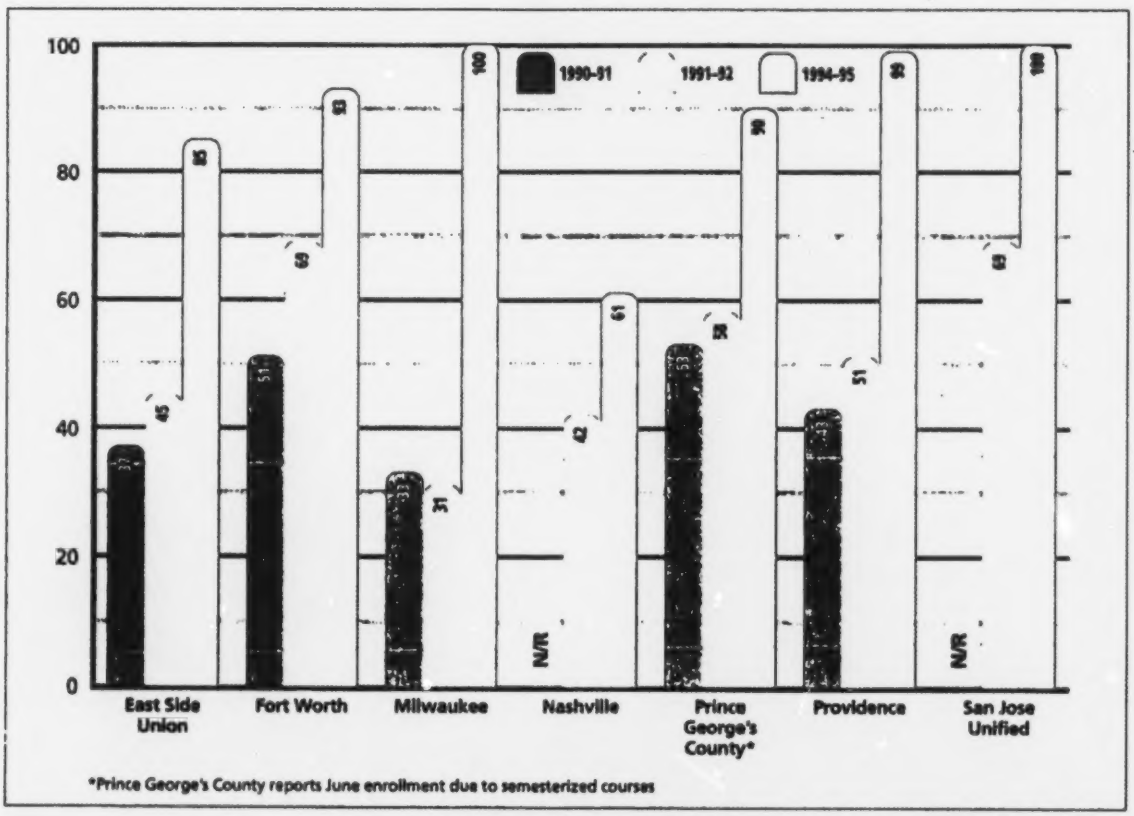

Figure 3. Change in Ninth-Grade Enrollment in Algebra I or Higher for Each Site

Indeed, a number of districts have come close to or reached the 100 percent enrollment target, including Fort Worth, Milwaukee, Providence, and San Jose Unified. Although not yet at 100 percent, the trends for the remaining three sites are strong and moving closer each year toward program goals. While some are at the targeted enrollment levels now, clearly many challenges remain for other sites.

Geometry

Like algebra I, enrollment for geometry and higher math courses was collected for all tenth graders in the fall of the school year, usually in October. Note that geometry enrollments are largely dependent on achievement rates in algebra I. Thus, at the point in time shown in Figure 4, it is not unexpected to find that geometry enrollments are further from program targets. Figure 4 shows changes over time across all sites. Given these caveats, the data suggest that the EQUITY 2000 sites are making good progress toward their enrollment targets. Geometry enrollment for tenth graders has increased since 1991 at all sites. In 1991-92, enrollment of tenth-grade students in geometry or higher ranged from 26 to 53 percent. By 1994-95, enrollment in geometry or higher ranged from 46 to 77 percent across the sites. As noted earlier, two of the sites, Fort Worth and San Jose Unified, targeted 1995-96 as the year for reaching 100 percent enrollment in geometry. These two sites appear to be making good progress toward their goal.

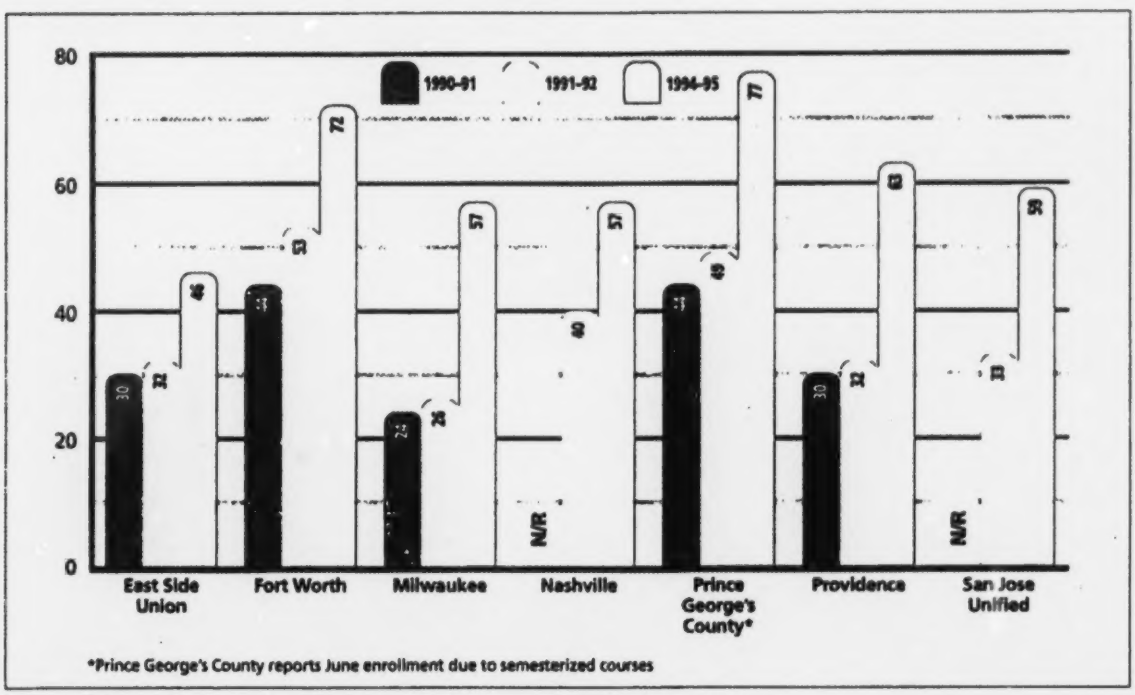

Figure 4. Change in Tenth-Grade Enrollment in Geometry or Higher for Each Site

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Like the algebra enrollments discussed earlier, these gains are impressive when placed in the context of the enrollment rates in these key courses prior to the implementation of EQUITY 2000.

Note: Detailed enrollment data for both algebra and geometry, across sites and by ethnicity, are presented in the Appendix, which shows changes in algebra and geometry enrollments at each of the sites from the beginning of their involvement in EQUITY 2000 through the 1994-95 school year.

Mathematics Achievement

Although the enrollment indicators are compelling, we also wanted to look at achievement rates as measured by both percentage of students passing the courses and percentage receiving grades of B or better. We present the findings on student achievement separately for ninth graders enrolled in algebra I and tenth graders enrolled in geometry.

Algebra

The algebra I course passing rates are shown graphically in Figure 5. Passing rates represent the percentage of ninth-grade students enrolled in algebra I who passed the course by the end of the school year. In 1991-92, those passing rates ranged from 62 to 88 percent across the sites. In contrast, the passing rates for 1994-95 ranged from 53 to 80 percent. Again, it is important to keep in mind that in 1991-92 a substantially smaller number of ninth-grade students were enrolled in algebra I than in 1994-95. We found, however, that passing rates in this key gatekeeper course have remained relatively high despite the significantly larger number of students enrolled. More than three-quarters of the students passed algebra I in Prince George's County (80 percent) and San Jose Unified (77 percent). Two sites were above 60 percent, East Side Union (68 percent) and Nashville (65 percent). Although the percentage of enrolled students who passed algebra I after implementation of EQUITY 2000 was lower than before, a higher absolute number of students were enrolled in and passing the course in 1994-95 as a result of the program.

Another indicator of the success of the program is the percentage of students receiving grades of B or better in algebra I. This indicator gives us a further sense of the extent of student learning and achievement in algebra. In more than half the districts, for example, about two of three students enrolled in algebra I in 1994-95 passed the course, as shown in Figure 5. Further, we estimated that nearly one in four of the students enrolled in algebra I in 1994-95 received a passing grade of B or better. Although there is some variation in both the passing rates and the

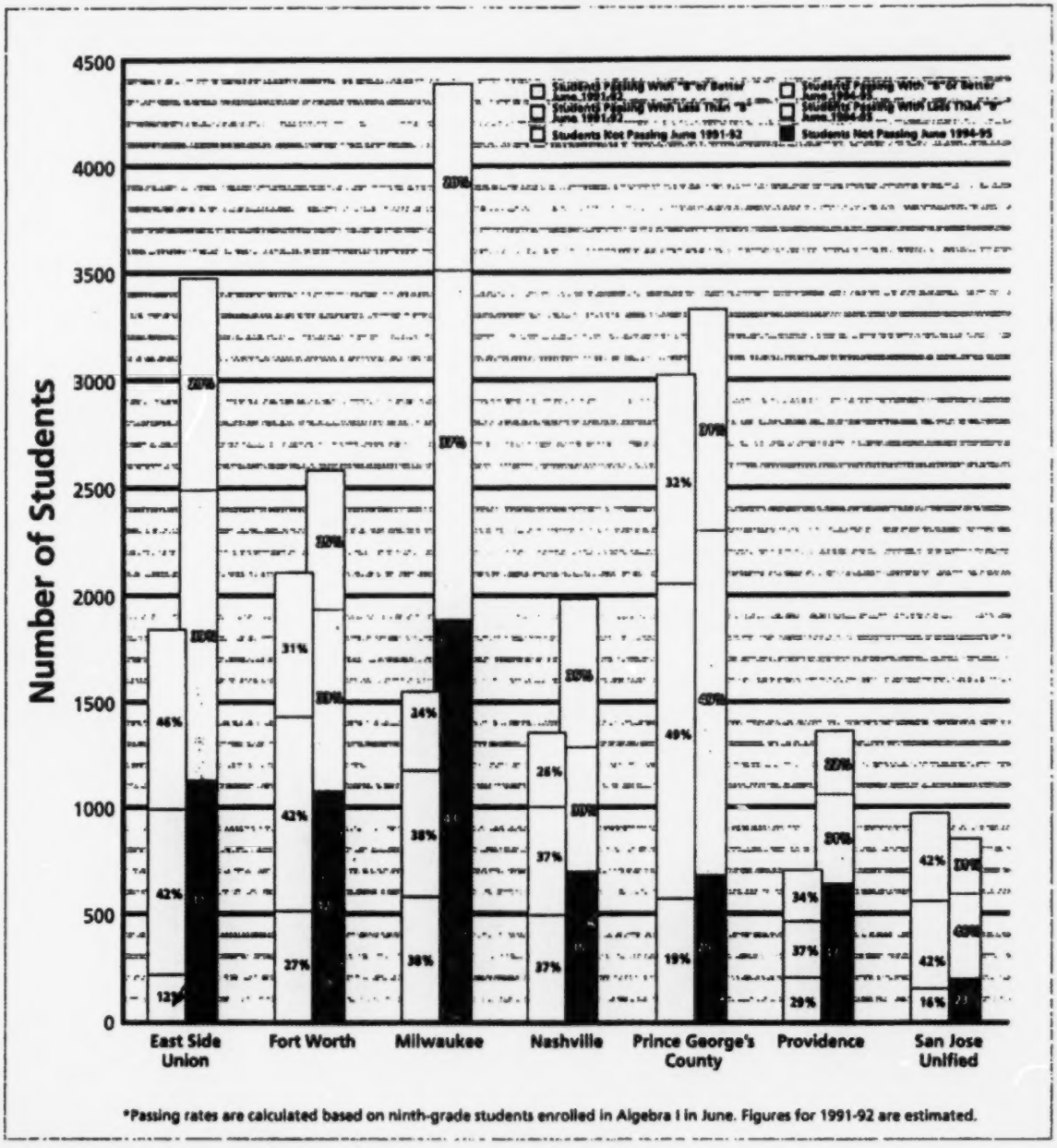

Figure 5. 1991–92, 1994–95: Ninth-Grade Students in Algebra I Passing and Receiving a Grade of B or Better

proportion receiving grades of B or better among the sites, these data on student achievement are impressive, particularly when placed in the context of substantially increased enrollments in these courses at all sites. In Nashville, over half the students passing algebra I received a grade of B or better. Without more detailed information about the grading practices in the classrooms at each of the sites, it is difficult to make sound inferences and comparative statements about the nature and

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extent of student achievement that go beyond the data in hand. Like the enrollment rates reported earlier, these preliminary achievement data suggest strong evidence of the project's success in achieving its twin goals of equity and excellence.

Geometry

The geometry course passing rates are presented graphically in Figure 6. They show the percentage of tenth-grade students enrolled in geometry who passed the course by the end of the school year. In 1991-92 those passing rates ranged from 71 to 93 percent across the sites. In contrast, the passing rates for 1994-95 ranged from 69 to 87 percent. Keep in mind that in 1991-92 a slightly smaller number of tenth-grade students were enrolled in geometry than in 1994-95. Passing rates in this key gatekeeper course have remained relatively high. More than three-quarters of the students passed geometry in Providence (77 percent), Fort Worth (79 percent), San Jose Unified (87 percent), and Prince George's County (87 percent). The data show that all of the sites had passing rates for tenth graders near or above 70 percent. Building on the impressive gains made in earlier math courses at three of the sites, Prince George's County, San Jose Unified, and East Side Union, 80 percent or

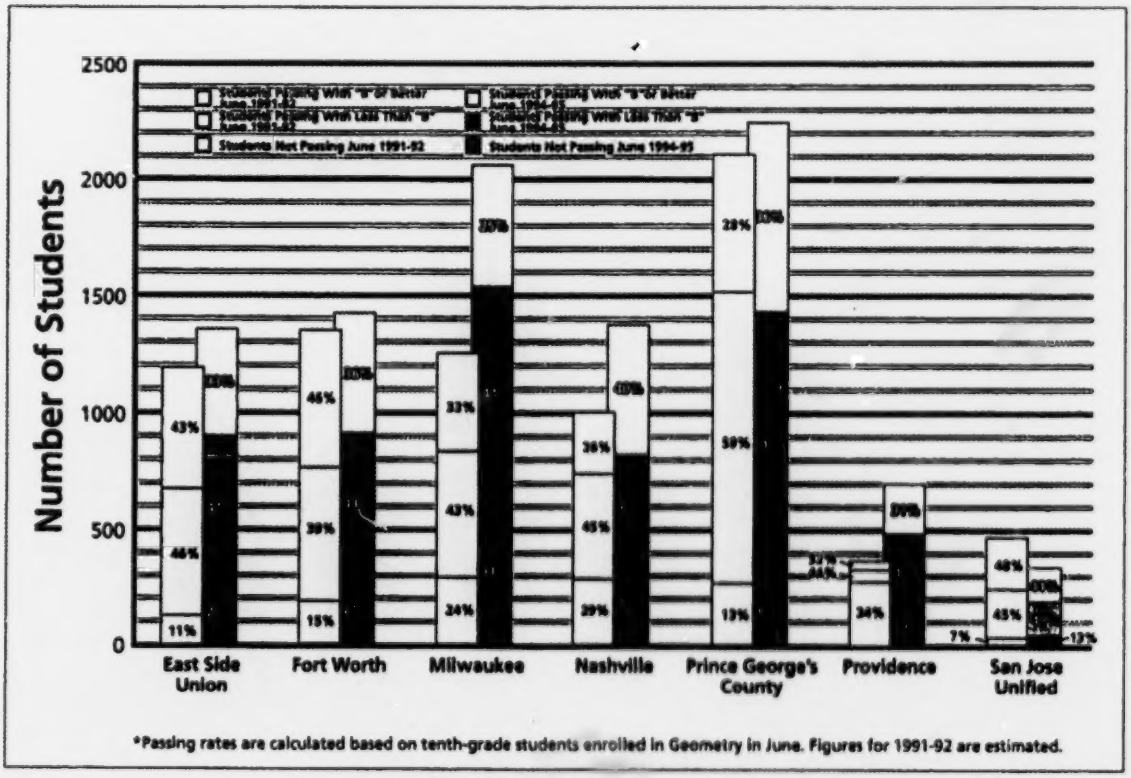

Figure 6. 1991–92, 1994–95: Tenth Grade Students in Geometry Passing and Receiving a Grade of B or Better

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more of tenth-grade students enrolled in geometry passed the course. From 1991-92 to 1994-95, with a slightly higher absolute number of students enrolled in the course, the number of students passing geometry across all sites remained stable.

If we look at the students passing geometry, we find that nearly four of five passed the course across all the sites in 1994-95. We estimated that nearly one in three of the students enrolled in geometry in 1994-95 received a passing grade of B or better. Again, there is variation in both passing rates and the proportion of students receiving grades of B or better among the sites. In Nashville, again over half the students who passed geometry received a grade of B or better. At the other sites, slightly fewer than half the students who passed received a grade of B or better. Similarly, at the San Jose Unified site those passing were split almost evenly between grades above and below B. Looking at both the enrollment and achievement data across all the sites, the evidence suggests that the increased exposure to math, along with teachers' and counselors' more positive attitudes toward student capabilities, is paying dividends in terms of student performance in the gatekeeper courses of algebra I and geometry.

The enrollment and achievement data reviewed here are compelling. According to researchers at Pelavin Research Institute, unprecedented numbers of students are taking and passing algebra I at the EQUITY 2000 sites. Yet passing rates remain strong. EQUITY 2000's policy change requiring detracking of the mathematics curriculum by eliminating lower-level mathematics courses and enrolling all students in algebra I, followed by geometry, led many to expect that student achievement would decline. In general, this has not happened. Indeed, the evidence to date, which was derived from passing rate estimates as well as from classroom observations, indicates that students are being exposed to rigorous course work both in algebra I and geometry. The next section discusses additional sources of evidence of improved student achievement in mathematics drawn from classroom observations and teacher focus groups.

Changing Students' Skills and Knowledge Base

The enrollment and passing rate indicators show that since the inception of EQUITY 2000, sites have progressed steadily toward reaching the goal of algebra and geometry for all students. Now that more students are in algebra and geometry, program stakeholders and others are concerned that students are learning the skills and knowledge that will give them access to college. Evidence of student learning and increased skill acquisition can be found in reports of classroom observations and from teacher focus groups. Although this information is observational

Evidence of Progress

Sites have progressed steadily toward reaching the goal of algebra and geometry for all students.

and often anecdotal, it does provide us with additional sources of evidence of the program's effectiveness.

Observing Mathematics Classes

Ninety-two observations of algebra and geometry classes were conducted over two years (1993-94 and 1994-95), and provide evidence of improved teaching and learning. Since EQUITY 2000 supports and uses National Council of Teachers of Mathematics (NCTM) content and teaching standards, observers looked for classroom practices that were consistent with those standards. The observations included references to specific pedagogical strategies, techniques, and materials recommended by the EQUITY 2000 National Math Committee and NCTM. The observational data show that geometry and algebra I teachers at the site are using a variety of NCTM and EQUITY 2000 instructional methods in their classrooms. The data show that very few rely solely on a single instructional approach. Overall, the data indicate that geometry classrooms were much more interactive than the algebra classrooms.

In general, observers described three types of instructional environments: (1) classrooms in which traditional modes of learning (i.e., expository and didactic modes) were in use; (2) classrooms that combined traditional and cooperative (i.e., students working together to solve problems with the teacher as facilitator rather than lecturer) learning modes; and (3) classrooms where cooperative learning approaches were used almost exclusively. Observers found traditional instructional approaches in about one-third of the algebra I classes and one-fourth of the geometry classes. Overall, they identified traditional instructional approaches in about one-third of the classes. They also reported that more often than not students in these classes appeared uninterested, with a variety of behaviors indicating that they were not paying attention to the task at hand (i.e., off-task). With few exceptions, the observers typically described low levels of student motivation and in-class performance.

Over a third of the algebra I and geometry classes used a combination of instructional approaches–both traditional and small group. Observers most often found in these instructional environments an emphasis on cooperative learning tasks, which quickly transformed traditional rows of desks into interactive environments. In contrast, cooperative learning approaches were used almost exclusively in another third of all algebra I and geometry classes. In these classes observers described the instructional practices, physical environments, and general affect of these classrooms as exciting and interactive, saying that it felt good to be there. Indeed, students in these classes appeared to be engaged in the task at hand, i.e., on-task student behavior was consistently observed. Moreover,

observers most often characterized cooperative classrooms as environments where students worked with each other enthusiastically and with high levels of interest, actively interacting with other students while working on lesson content.

Earlier we reported focus group findings that reflected changed attitudes toward student ability. Here, we present findings from teacher and principal focus groups that relate how they are providing students with the skills and knowledge needed for access to college. Our discussion is organized around the themes of equity, pedagogy, and content.

Equity

Teachers at all sites drew distinctions between the ideas that all students can learn and that all students can learn algebra I. Generally, most teachers believed that few students were incapable of learning and that all students could learn algebra. Most were unwilling to accept the idea that black or Hispanic students were incapable of learning such mathematics, and without exception challenged those who held opposing views on this issue. For example, the majority of teachers in the focus groups stated that minority and disadvantaged students, as a result of the EQUITY 2000 project, had a better chance of learning algebra and going to college. Not surprisingly, there were a small number of teachers who strongly articulated their belief that algebra was a subject that not all students were capable of learning. In general there was a sense that teachers believed that all students were capable of learning algebra.

Teachers in the focus groups stated that minority students had a better chance of learning algebra and going to college.

Pedagogy

In the focus groups, specific improvement in teacher–instructional leadership strategies and classroom teaching strategies were attributed to EQUITY 2000. Overall, teachers stated that students were engaged in a qualitatively different and positive experience with mathematics as a result of the NCTM emphasis on hands-on concrete activities, real-world approaches, and the integration of manipulatives, calculators, and computers. For example, most teachers reported strong and positive experiences with cooperative learning approaches over traditional approaches. Similarly, few said that the instructional approaches to teaching algebra and geometry learned through the project were incorrect approaches to teaching these subjects. Those who did tended to be the individuals with negative beliefs about most of the project. At each site there were teachers who said that the pedagogical approaches emphasized in EQUITY 2000 had improved their mathematics instruction. In general those in the focus groups believed that each behavior in the classroom directly affects students acquisition of the

skills and knowledge needed for high levels of academic achievement. Moreover, teachers generally acknowledged that the innovative teaching approaches promulgated through EQUITY 2000 had improved their math classes.

Content

Across the sites, mathematics teachers were well versed in their content areas. The majority of those interviewed were certified in mathematics and held Masters' degrees in mathematics. These teachers said that the greatest impact of EQUITY 2000 for them was the enhancement of their own knowledge of the subject matter and the availability of better instructional materials. Again, the belief expressed by the teaching faculty is that their increased knowledge of mathematics, combined with newly developed curricular materials, will improve student learning.

A major concern, however, was related to the availability of appropriate assessments to accurately gauge student learning. Most teachers spoke of the difficulty of providing assessments for some students, given the different approaches to course sequencing and pacing. This issue is particularly problematic in districts that now require algebra for high school graduation and that have initiated a variety of course formats, e.g., semester and block scheduling. The new curricular sequences in mathematics often result in a rapid rise in mathematics course variations, both in the way the courses are taught (i.e., timing, sequence, and scheduling) and the scope of content coverage. Thus, we see that these modifications to the ways in which algebra and geometry are taught at EQUITY 2000 sites present challenges to the development of assessments that foster student learning and promote achievement in mathematics.

The reports appear to reflect new and exciting changes in pedagogy, perceptions, content, and equity.

In summary, it appears from the observations and focus groups that students are being exposed to new and creative ways of learning algebra and geometry with instruction at the EQUITY 2000 sites changing and moving in the direction of the NCTM standards. Teachers and students are grappling with what it means to rethink teaching and learning in algebra and geometry. We are witnessing more widespread use of cooperative learning and other collaborative techniques in these classrooms. We are hearing voices that echo shifting attitudes and conceptions about what students can learn. Indeed, teachers' expectations for all students are changing and growing. The reports from the teachers and the classrooms appear to reflect new and exciting changes in perceptions, equity, pedagogy, and content. These changes suggest that students at the sites are, in general, being exposed to improved forms of mathematics instruction and to the skills and knowledge that will better prepare them for postsecondary education. The program has also been able to identify challenges that were not as

evident before, including the need for improved assessments, new course formats and schedules, and alternative forms of instruction to address the learning styles of all students.

EQUITY 2000's Contribution to Educational Reform

As we have mentioned in our introduction, one of the challenges of systemic educational reform is the difficulty of sustaining it over long periods. A central goal of EQUITY 2000 is to institutionalize the reform model. Within the context of systemic reform, the EQUITY 2000 model allows for organization, consolidation, and collaboration of efforts across an entire district. In looking at the continuum of reform from the state level to the individual classroom, district level reform appears to be a powerful lever for change. Reports from the focus groups underscore the fact that the policy of increasing access to algebra, geometry, and other high-level mathematics classes for all students drives reform in the district. When asked how their districts have been affected by EQUITY 2000, district administrators spoke of the implemented policy changes, strategic planning changes, and institutionalization plans made at the district level. They gave examples of how the EQUITY 2000 model had acted as a catalyst for reform in their district. At some sites, the model provided a forum for discussion of reform ideas and strategies and offered opportunities for dialogue among principals of K–12 schools. Further, at sites where reform was occurring before EQUITY 2000's implementation, district and school administrators used the EQUITY 2000 model as support for other policy changes as they carried out preexisting reform plans. In many cases, the EQUITY 2000 reform model has been used as a basis for district strategic plans or has been incorporated as part of the district mission. Thus, the evidence to date indicates that across sites this districtwide policy is the central component of the model because it drives change in schools and classrooms, facilitates professional development, and fosters institutionalization of the best practices across the district.

Conclusion

Taken together, the various lines of evidence we have examined in this report suggest that EQUITY 2000 is continuing to move toward its twin goals of promoting equity and academic excellence. Evidence gathered to date indicates that many of the program's reform efforts have taken hold in the districts, albeit in different forms and with some variation. These are encouraging signs of EQUITY 2000's success.

We have documented, for example, positive changes in the attitudes of teachers and counselors about their students' abilities and aspirations, and we have witnessed improved instructional practices in many math classrooms and coordinated teaming of professional mathematics educators within and across many of the sites. The data from surveys of counselors indicate that their attitudes and expectations regarding students' capabilities have changed markedly over the course of the pilot phase. In addition, the survey data across all three years and all sites indicate that teachers' expectations for themselves and about student learning and achievement have changed, with the majority believing that their teaching can improve and that their students can learn higher-level mathematics. Similarly, teachers' estimates of the number of students capable of taking and passing algebra and geometry increased substantially, as did their estimates of the number of students capable of attending and doing well in college. These data, along with the observational and focus group data, reinforce the view of EQUITY 2000 as a powerful vehicle for district policy reform, attitudinal change, and professional development.

Evidence gathered to date indicates that many of the program's reform efforts have taken hold in the districts.

Further, enrollment trends suggest the program is approaching its stated objective of 100 percent enrollment in algebra or higher by the ninth grade. Like algebra enrollments, geometry gains are also impressive. Indeed, according to researchers at Pelavin Research Institute, the most significant finding is that ". . . not only are more students taking algebra, but 50 percent or more of those students are passing algebra I. These findings give strong evidence of the success of the policy upon which EQUITY 2000 is built." (1994–95 National Implementation Report, p. 26).

Additional signs of the program's success are found in the preliminary measures of student learning and achievement in mathematics. Evidence from passing rate estimates in algebra I and geometry, as well as classroom observations in these key courses, indicate that many students are being taught by talented teachers and are exposed to rigorous mathematics course work. Converging evidence of student learning and increased skill acquisition comes from reports of classroom observations and from teacher focus groups, which suggest that mathematics instruction at the EQUITY 2000 sites is changing and moving in the direction of the NCTM standards. As we noted earlier when we discussed classroom observations, across all sites we witnessed the use of

cooperative learning and other collaborative techniques in classrooms. These changes suggest that students at the sites are, in general, being exposed to improved forms of mathematics instruction and to the skills and knowledge that will better prepare them for postsecondary education. Indeed, teachers and students at all sites are grappling with what it means to rethink teaching and learning in algebra and geometry to foster success.

In sum, the data compiled to date along with the perceptions of those we have interviewed tell us that EQUITY 2000 is making a difference in the districts in terms of educational policy, attitudes about learning, classroom practices, and student achievement. Many have said that without districtwide policy changes, the EQUITY 2000 model would be similar to other educational reform efforts that are implemented in isolated schools or classrooms, and focus only on pedagogy or content. The districtwide focus of EQUITY 2000 allows for organization, consolidation, and collaboration of reform efforts across the district. In looking at the continuum of reform from the state level to the individual classroom, district-level reform appears to be a powerful lever for change.

In the coming weeks and months, we will be turning our attention to the information and evidence currently being analyzed by our various teams of evaluators in an ongoing attempt to learn more about how the EQUITY 2000 reform model works to foster change and improvement in our nation's schools.

Appendix: Site Enrollment by Ethnicity

Key to Appendix Figures

1990-91 1991-92 1992-93 1993-94 1994-95

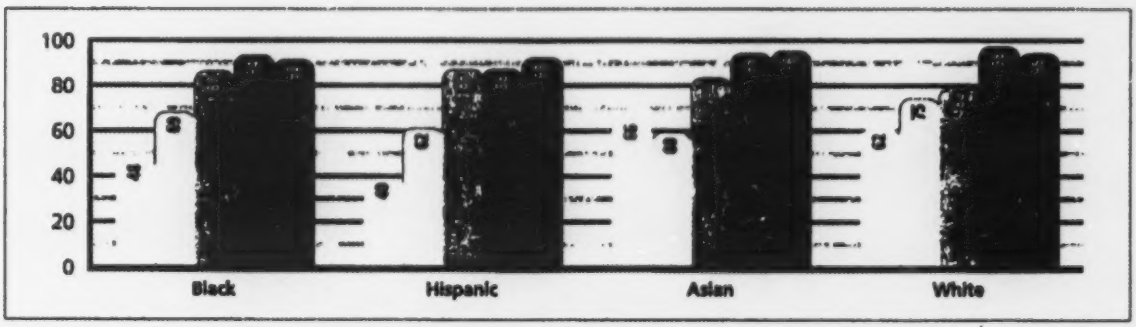

Figure A1. Percent of Ninth Graders Enrolled in Algebra I or Higher—Fort Worth

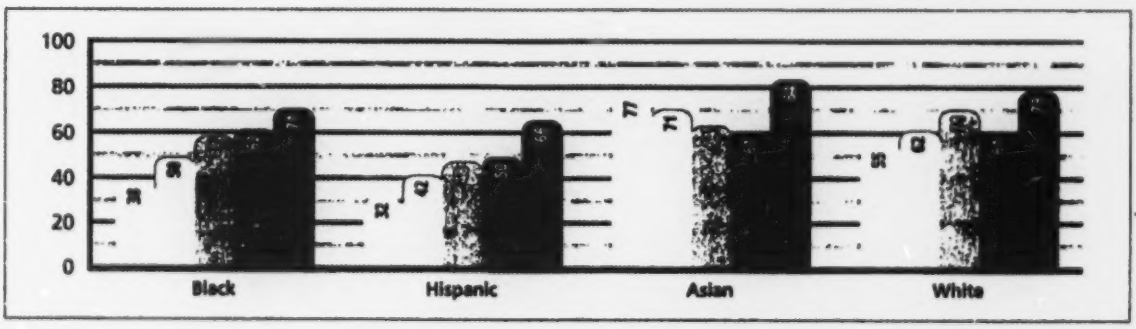

Figure A2. Percent of Tenth Graders Enrolled in Geometry or Higher—Fort Worth

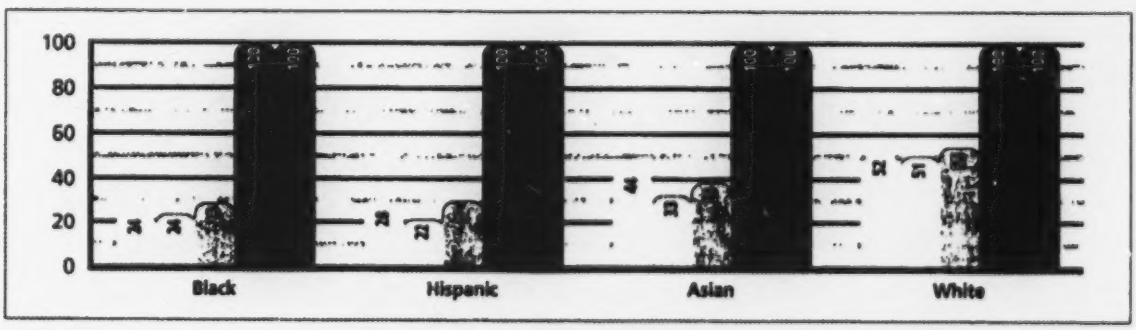

Figure A3. Percent of Ninth Graders Enrolled in Algebra I or Higher—Milwaukee

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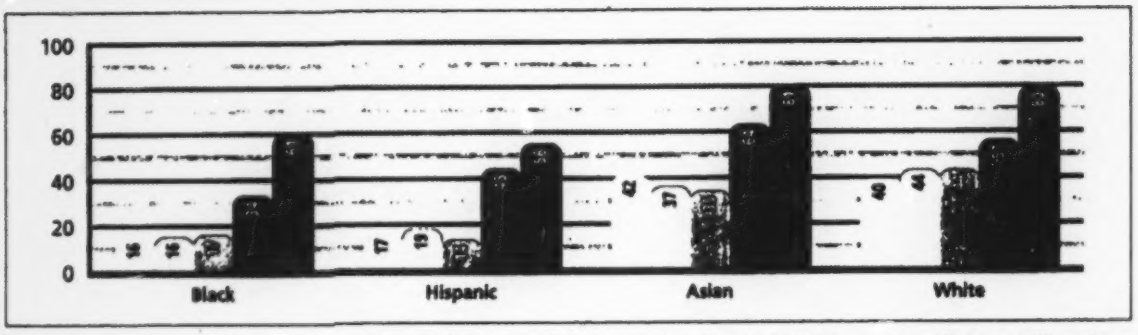

Figure A4. Percent of Tenth Graders Enrolled in Geometry or Higher—Milwaukee

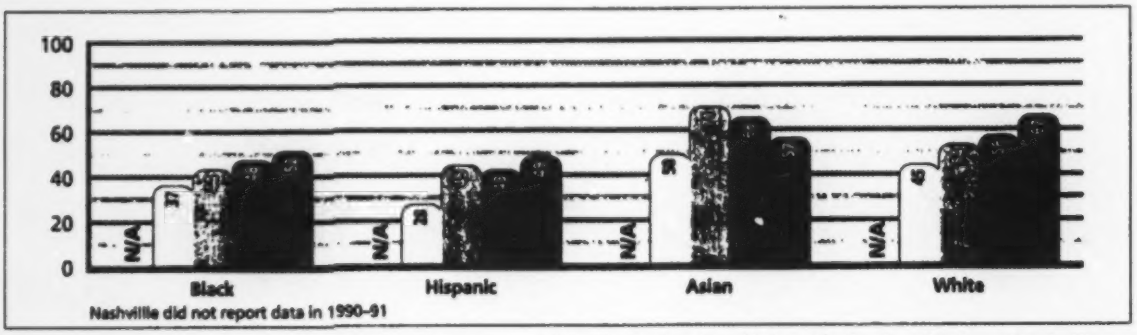

Figure A5. Percent of Ninth Graders Enrolled in Algebra I or Higher—Nashville

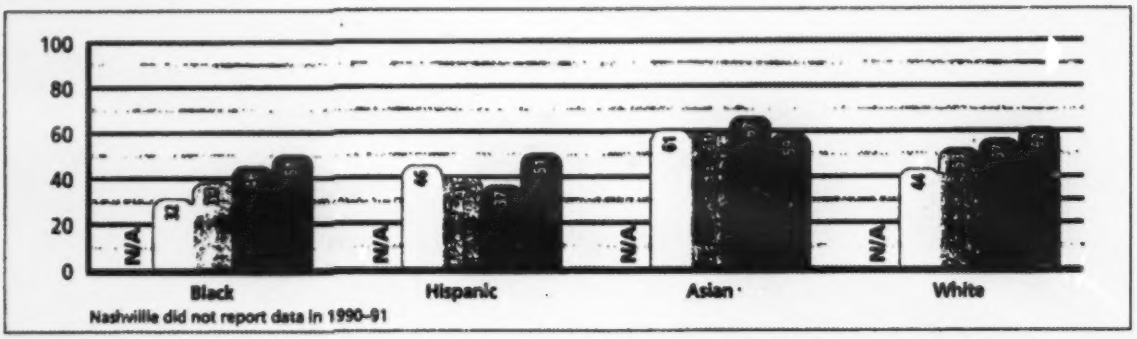

Figure A6. Percent of Tenth Graders Enrolled in Geometry or Higher—Nashville

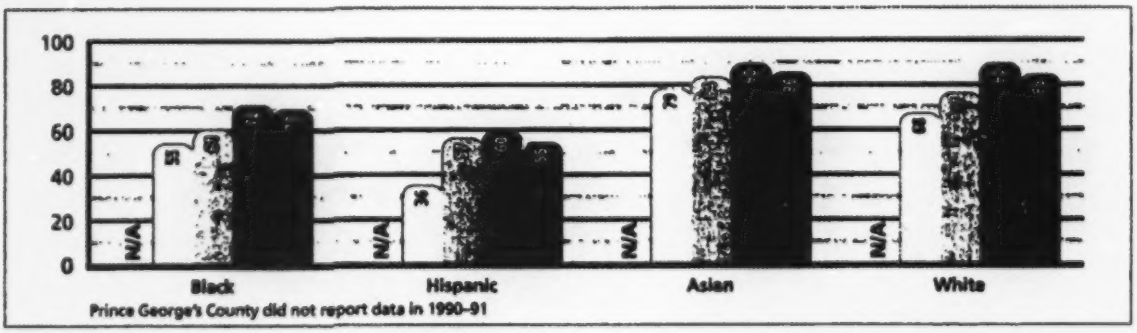

Figure A7. Percent of Ninth Graders Enrolled in Algebra I or Higher—Prince George's County

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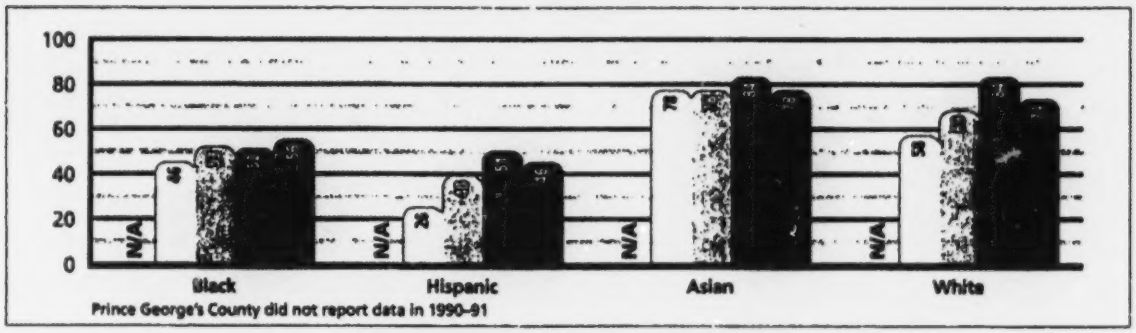

Figure A8. Percent of Tenth Graders Enrolled in Geometry or Higher—Prince George's County

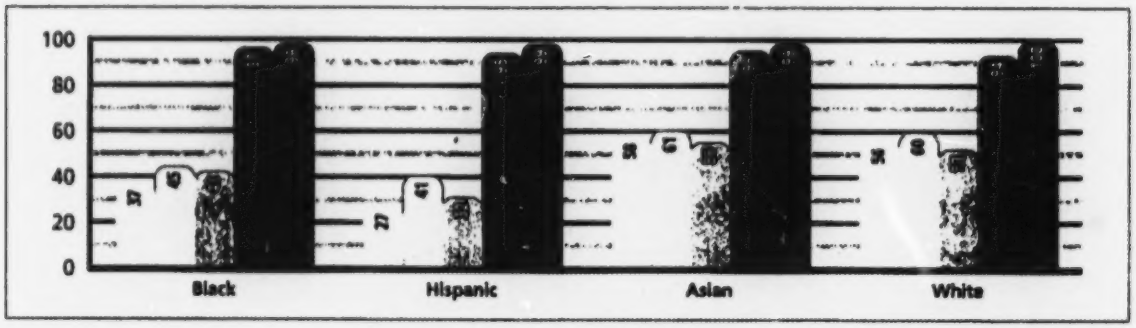

Figure A9. Percent of Ninth Graders Enrolled in Algebra I or Higher—Providence

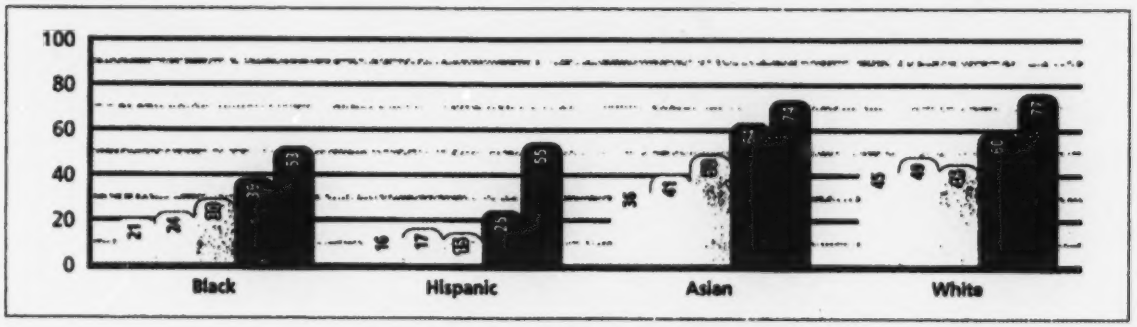

Figure A10. Percent of Tenth Graders Enrolled in Geometry or Higher—Providence

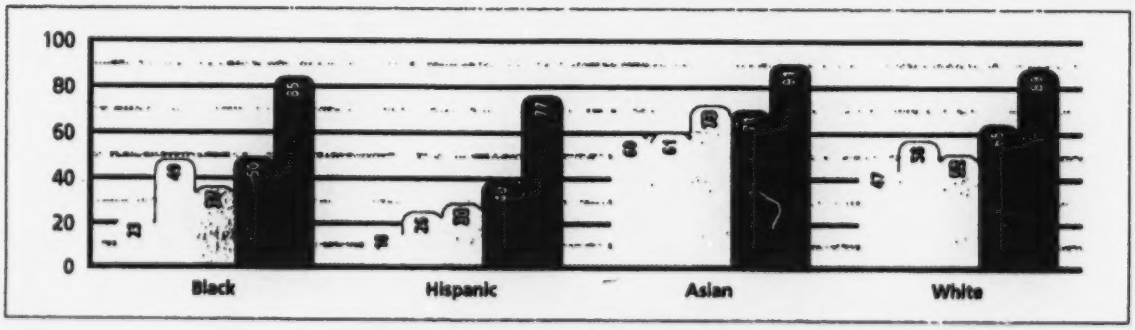

Figure A11. Percent of Ninth Graders Enrolled in Algebra I or Higher—San Jose-East Side Union

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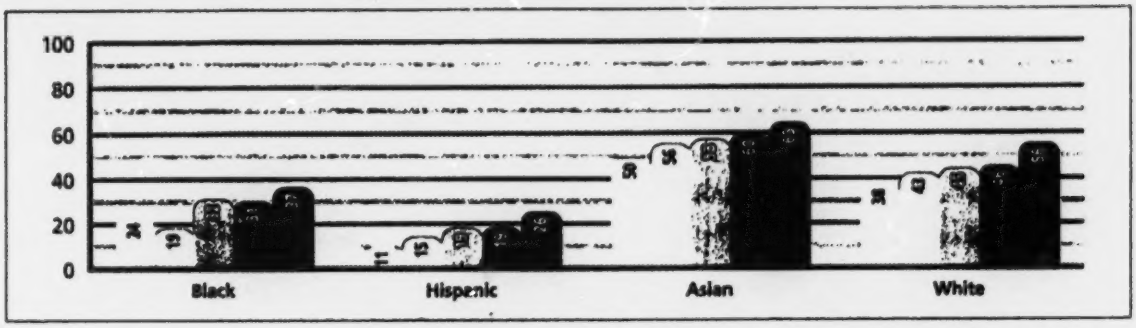

Figure A12. Percent of Tenth Graders Enrolled in Geometry or Higher—San Jose-East Side Union

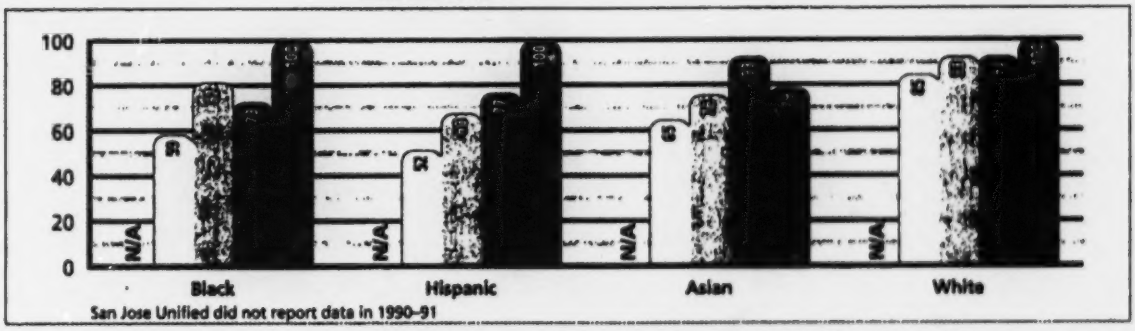

Figure A13. Percent of Ninth Graders Enrolled in Algebra I or Higher—San Jose Unified

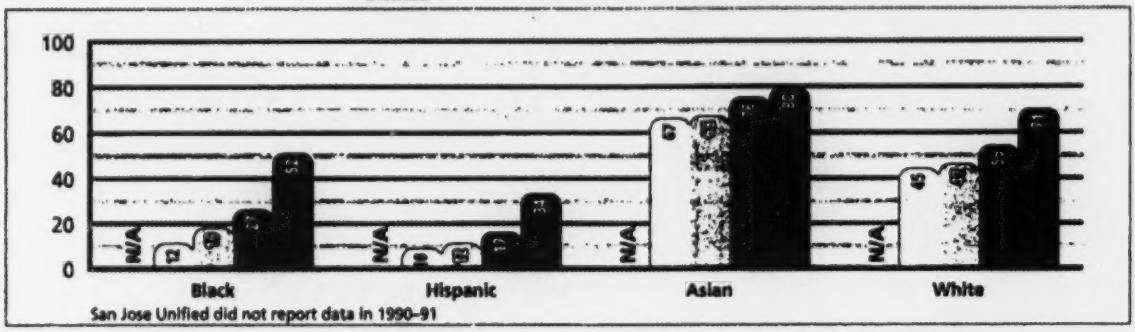

Figure A14. Percent of Tenth Graders Enrolled in Geometry or Higher—San Jose Unified

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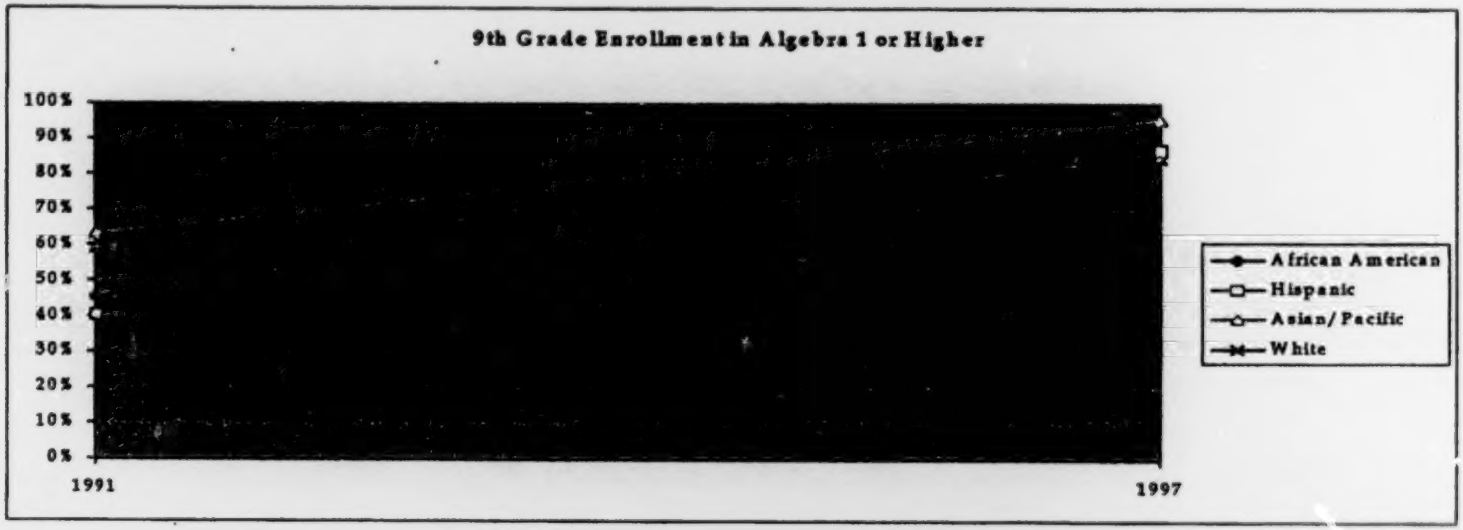
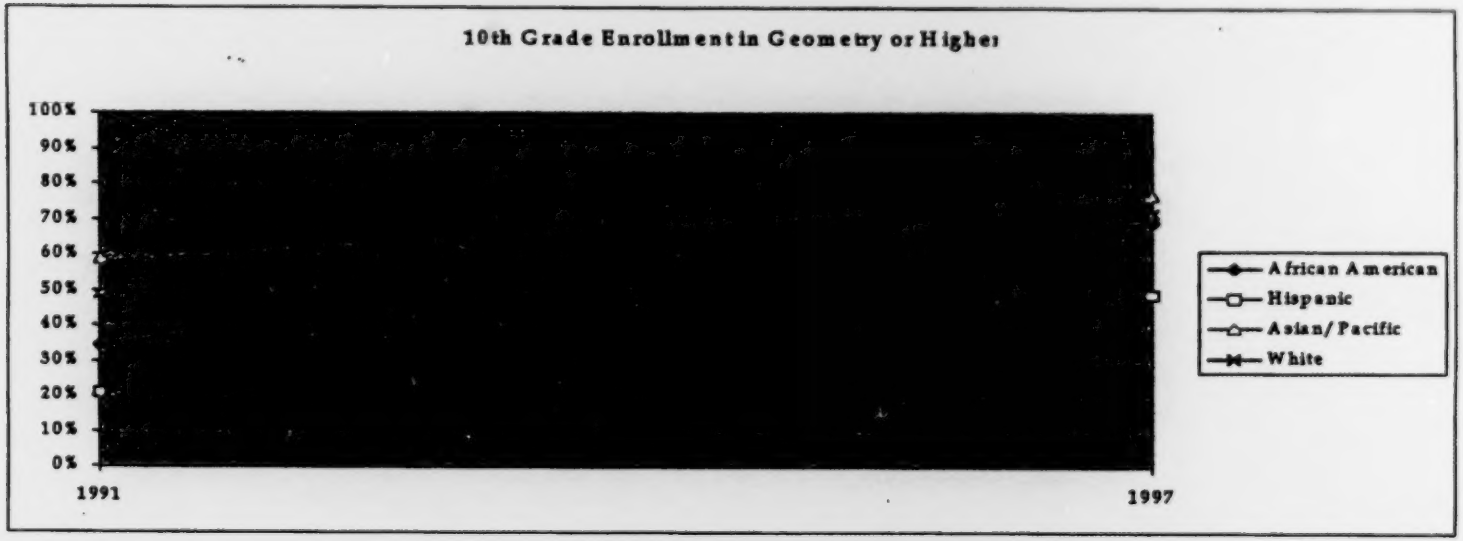
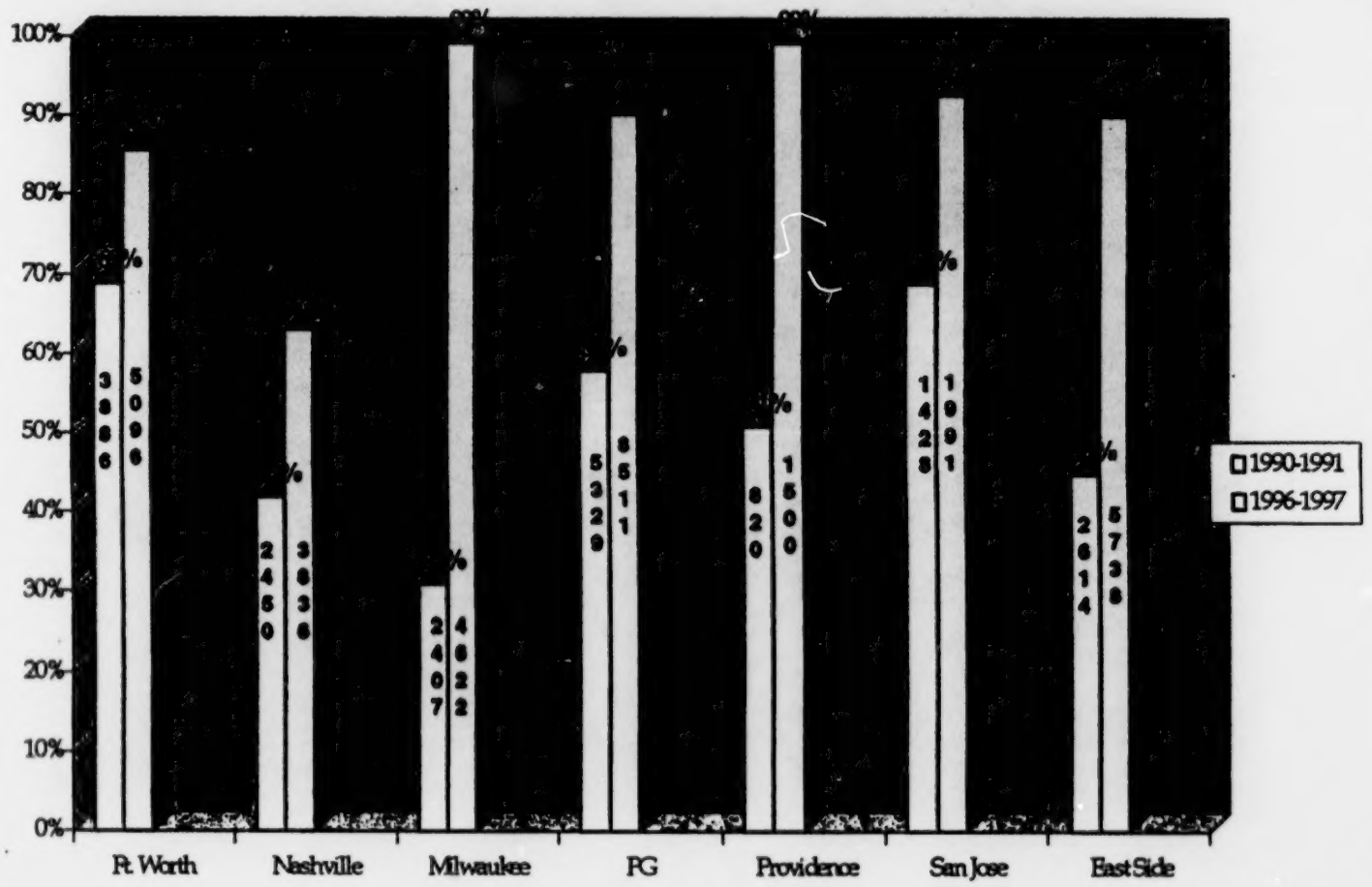




1991 Data Source: Pelavin Summative Evaluation, December 1997
1997 Data Source: Equity 2000, The College Board, February 1998

Comparison of 9th Grade Enrollment in Algebra 1 or Higher, 1991 to 1997



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1997 Data Source: Equity 2000, The College Board, February 1998

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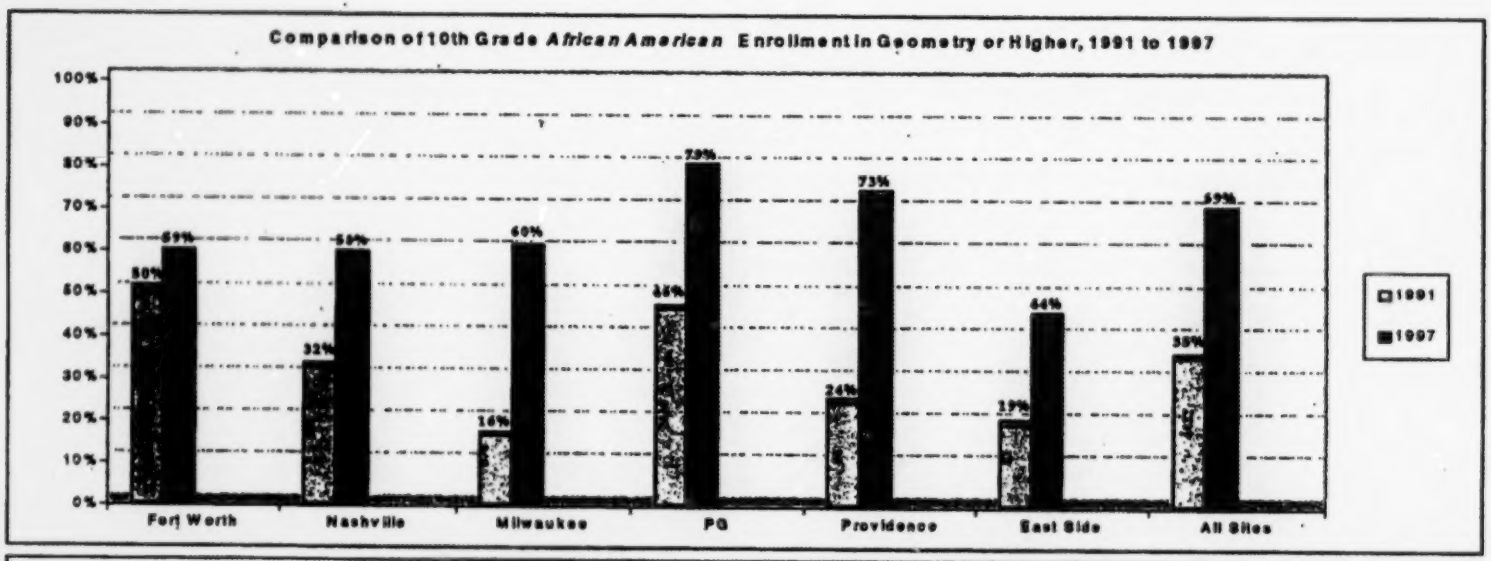

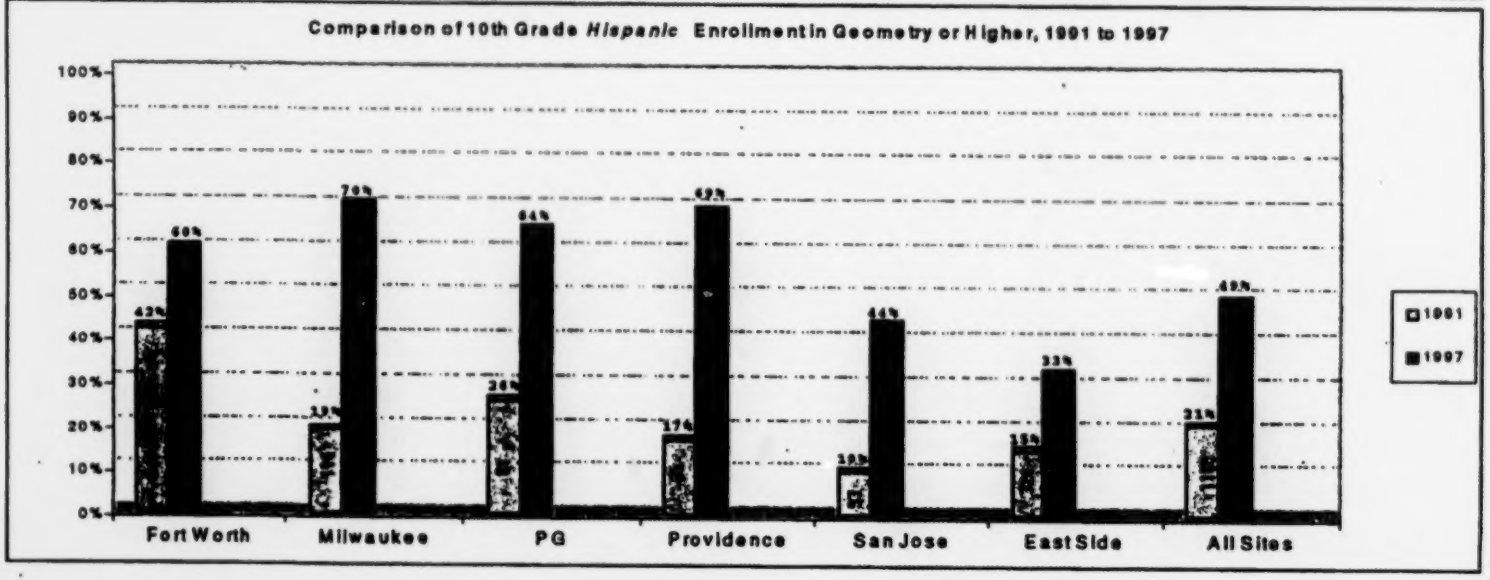

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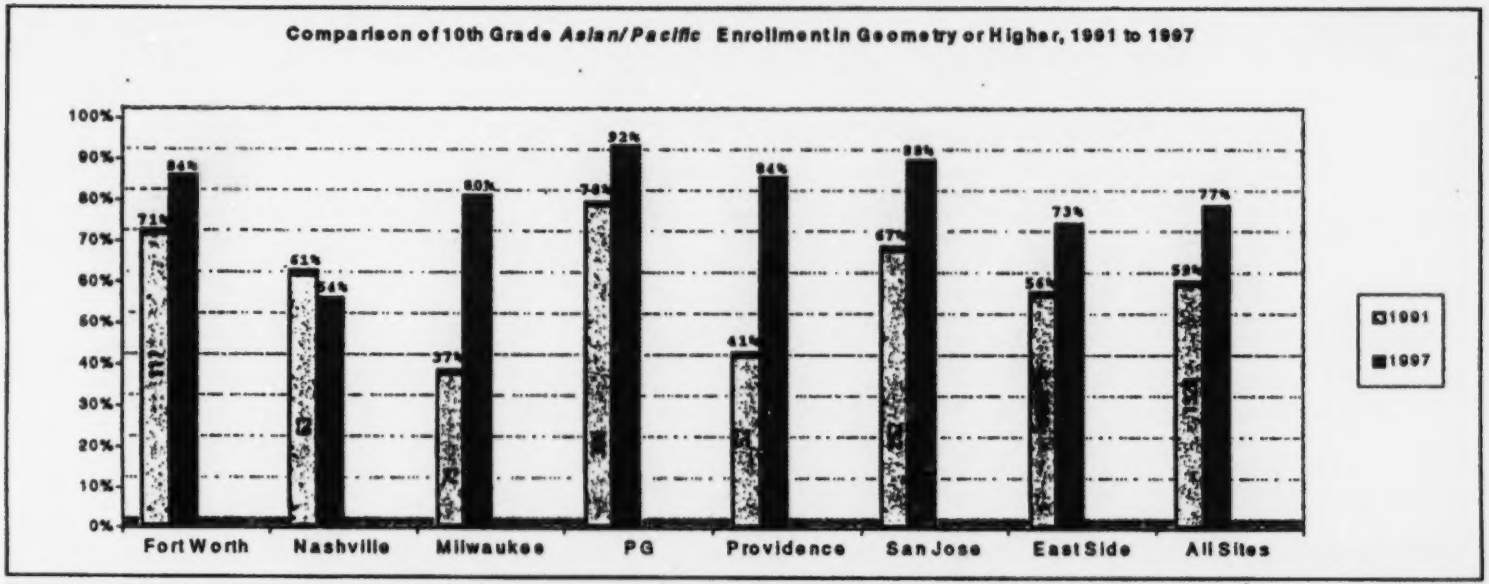

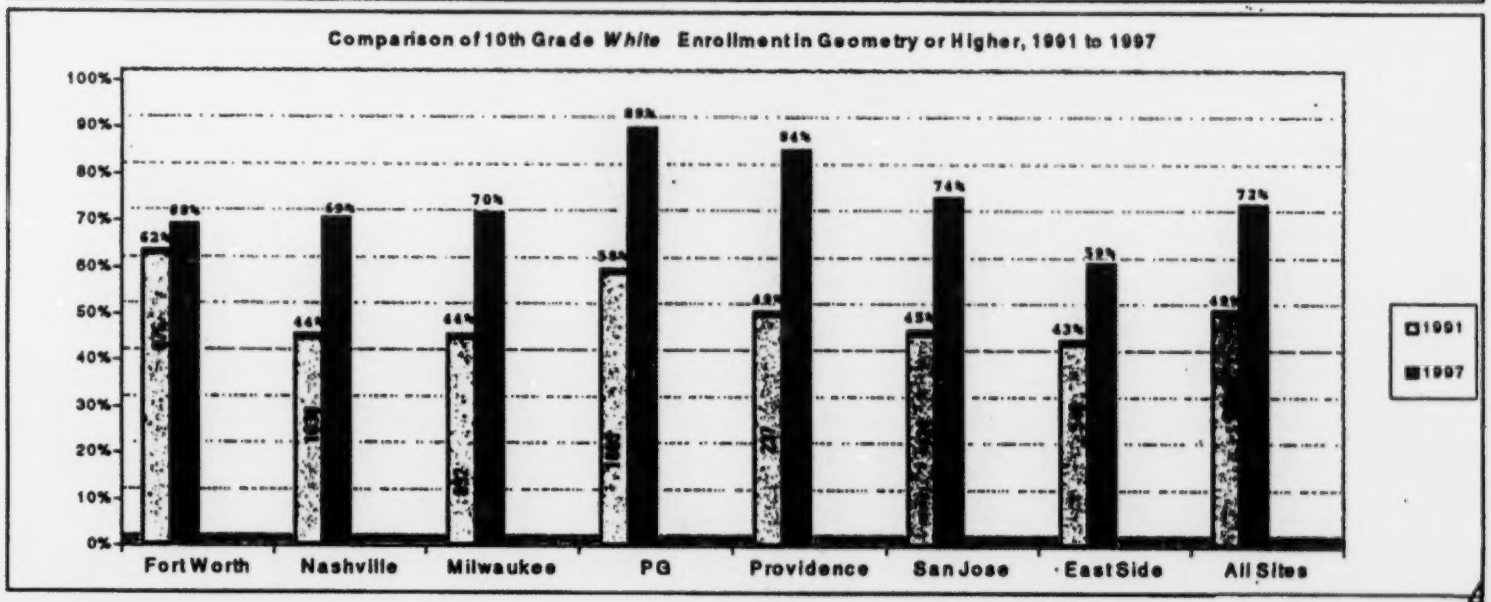

1991 Data Source: Pelavin Summative Evaluation, December 1997
1997 Data Source: Equity 2000, The College Board, February 1998

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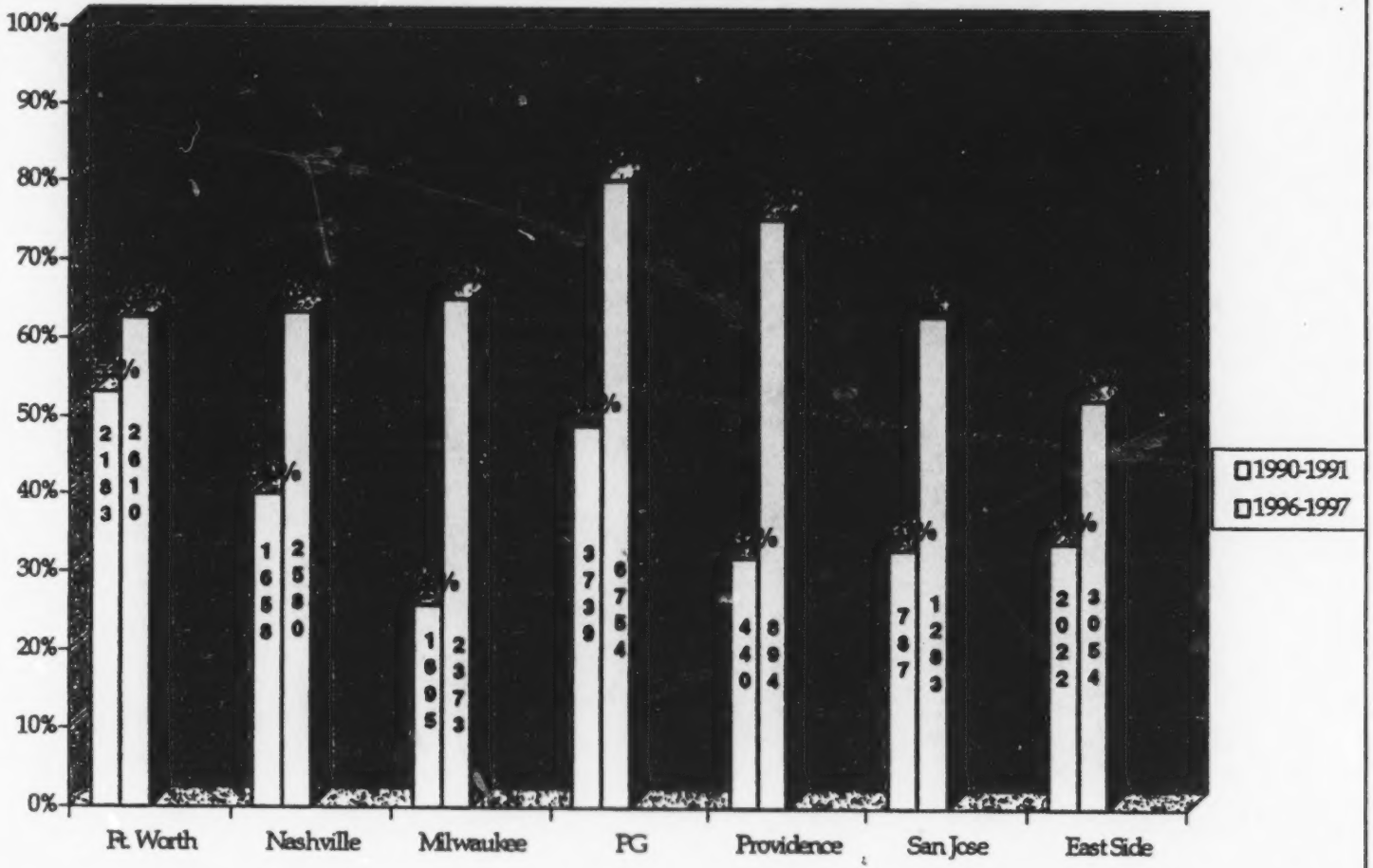
Comparison of 10th Grade Enrollment in Geometry or Higher, 1991 to 1997



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1997 Data Source: Equity 2000, The College Board, February 1998

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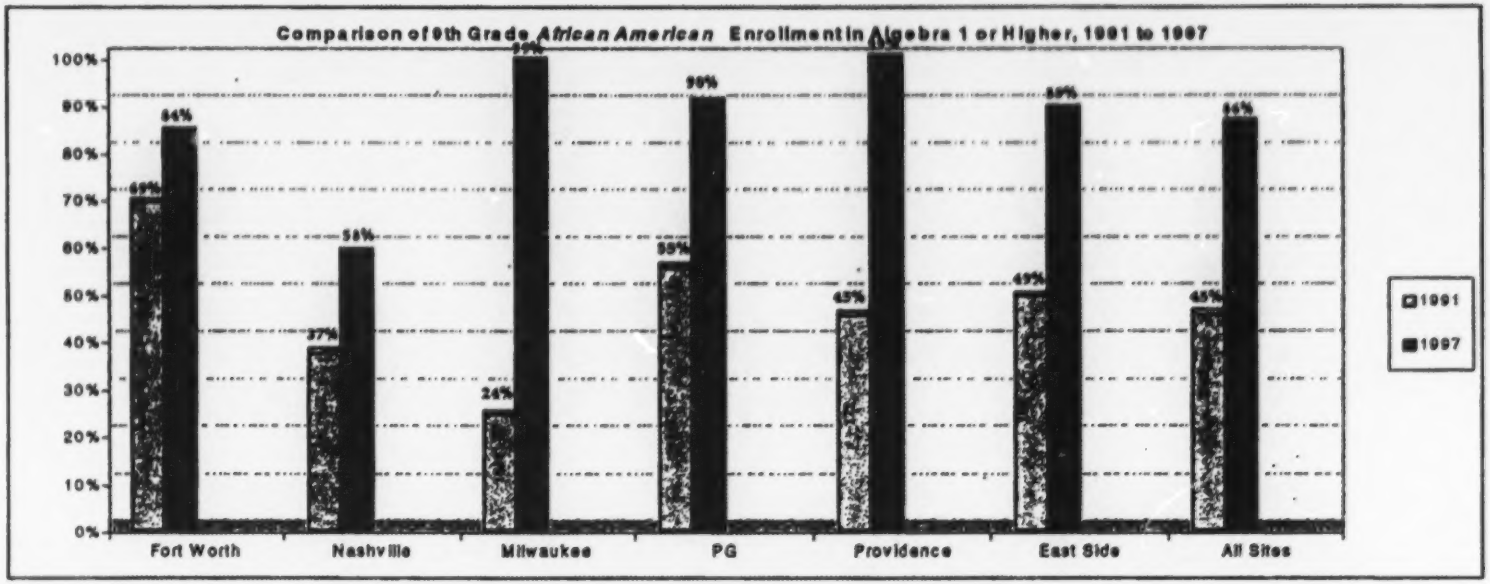

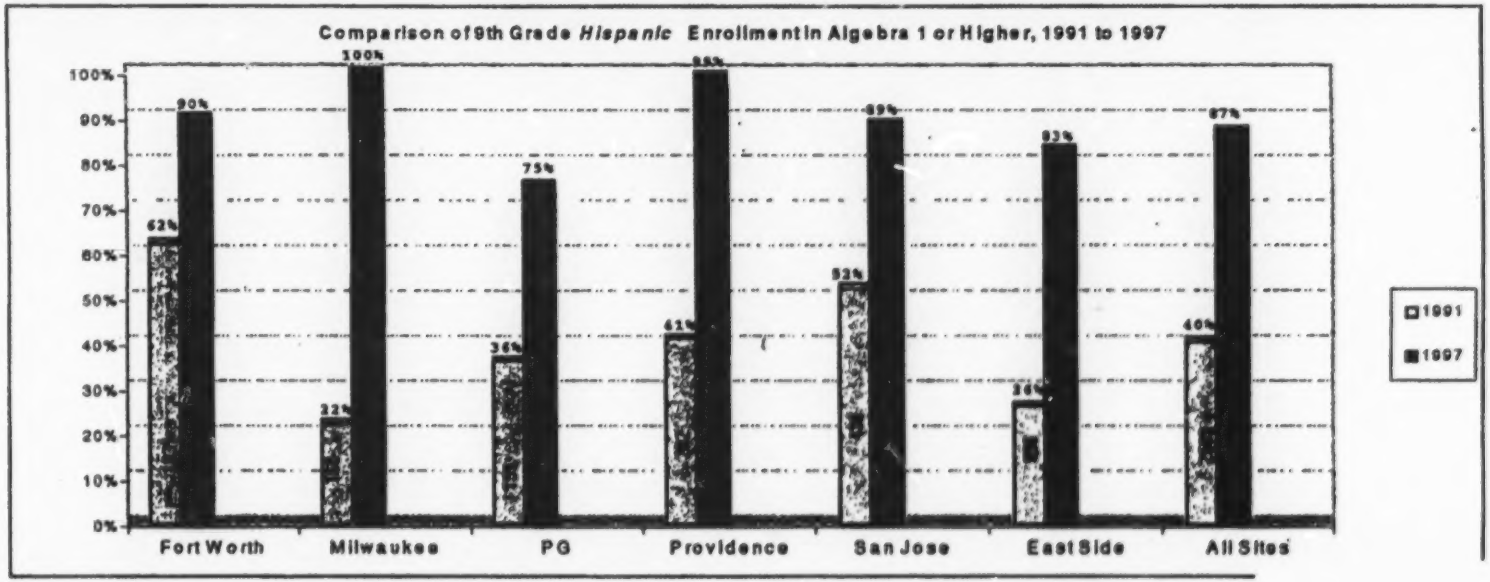

1991 Data Source: Pelavin Summative Evaluation, December 1997
1997 Data Source: Equity 2000, The College Board, February 1998

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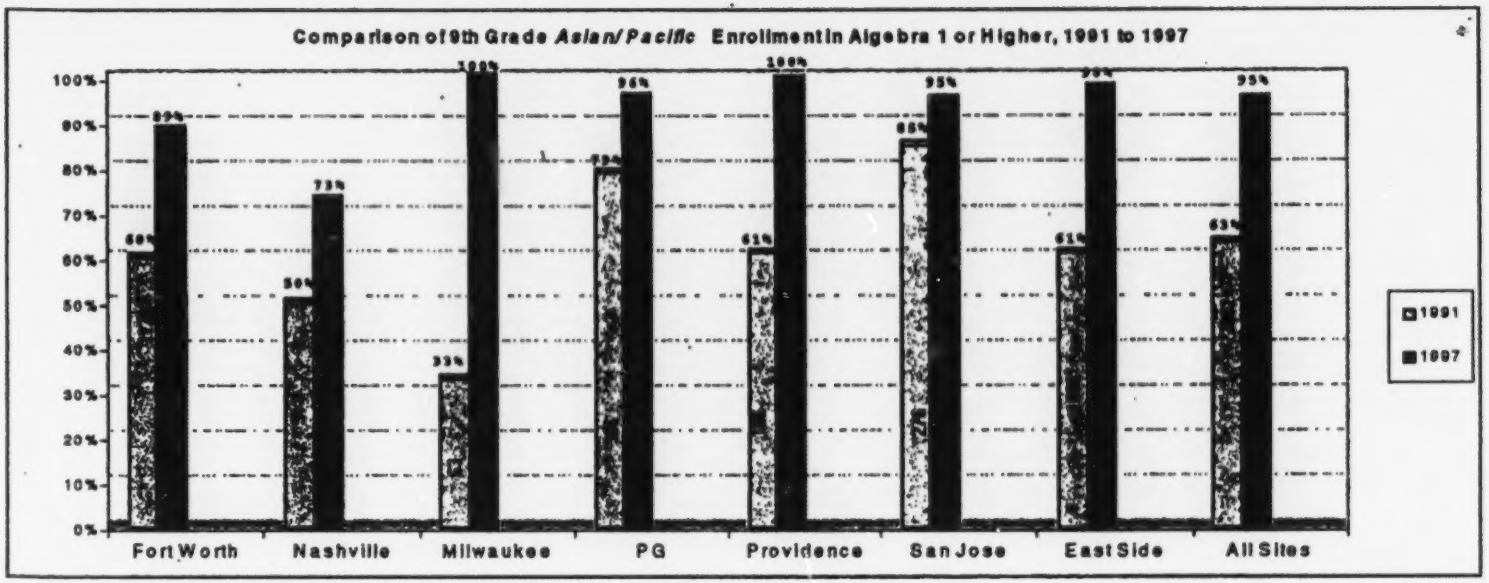

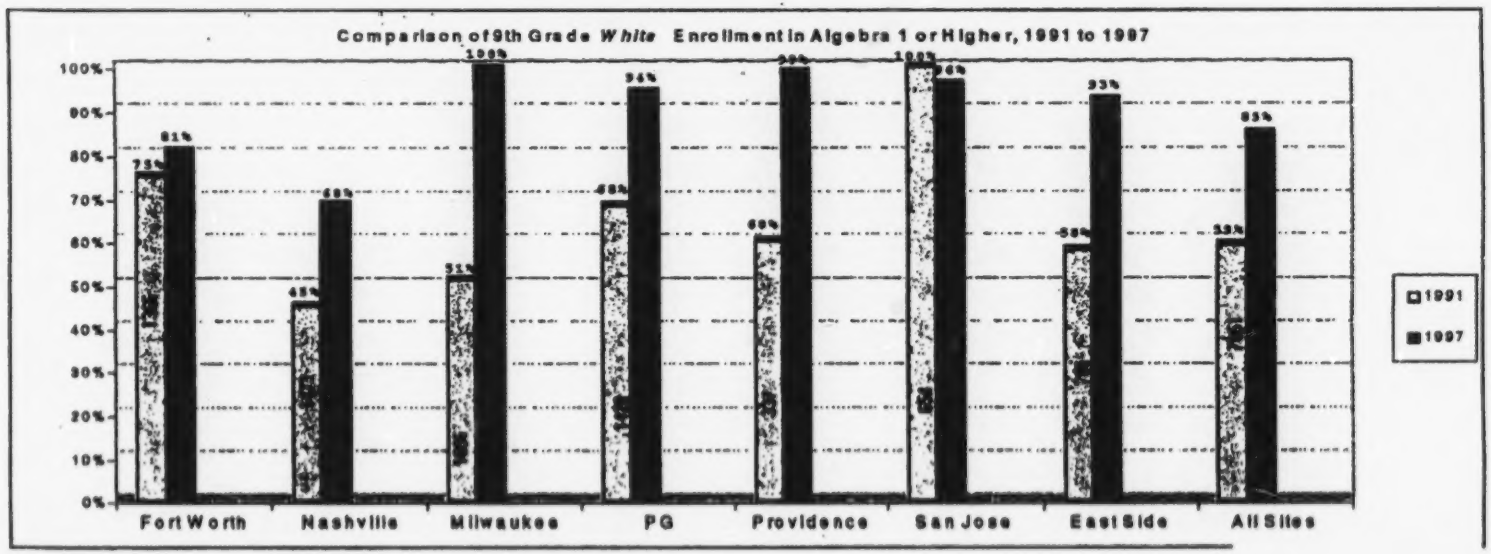

1991 Data Source: Pelavin Summative Evaluation, December 1997
1997 Data Source: Equity 2000, The College Board, February 1998

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